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PART NO.: MC2004E-SERIES

FOR MESSRS.: ____________________

CONTENTS

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ACCEPTED BY: ____________________ PROPOSED BY : ____________________

RECORD OF REVISION

DATE	PAGE	SUMMARY

3. General specifications

3.1 General specifications

PLEASE REFER TO:

"CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-0069)"

3.2 This individual specification is prior to general specifications

3.3 NUMBERING SYSTEM

MC2004E	B	W	-	S	Y	M	L	O	U	N
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)

(1).CHARACTER FONTS：

PLEASE ERFER TO

"CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-0069)"

(2).LCM TEMPERATURE：

"nil" ： NORMAL TEMP

"W" ： WIDE TEMP

(3).LCD TYPE：

"T" ： TN TYPE　　"S" ： STN TYPE

"H" ： HTN TYPE　　"F" ： FSTN TYPE

(4).LCD COLOR：

"Y" ： YELLOW-GREEN　　"B" ： BLUE(STN/NEGATIVE)/BLACK(FSTN/NEGATIVE)

"G" ： GRAY　　"W" ： WHITE(FSTN/POSITIVE)

(5).LCD POLARIZE TYPE

"nil" ： TRANSFLECTIVE

"M" ： TRANSMISSIVE

(6).BACKLIGHT TYPE：

"L" ： LED BACKLIGHT

"E" ： EL BACKLIGHT

"R" ： REFLECTIVE

(7).BACKLIGHT COLOR：

LED TYPE：

"nil" ： YELLOW-GREEN　　"A" ： AMBER

"O" ： ORANGE　　"R" ： RED

EL TYPE：

"nil"： WHITE　　"B" ： BLUE-GREEN

(8). VIEWING DIRECTION：

"nil" ： 6 O' CLOCK　　"3" ： 3 O' CLOCK

"U" ： 12 O' CLOCK　　"9" ： 9 O' CLOCK

(9).BACKLIGHT TYPE：

"nil"：LED(+),LED(-)---NORMAL　　"N"：LED(+),LED(-)---CHANGE

4. Mechanical data

(1) NUMBER OF CHARACTER----------------20 CH * 4 LINE

(2) MODULE SIZE --------------------------------98.0 W * 60.0 H * “ C ” T (max) mm

(3) EFFECTIVE AREA----------------------------76.0 W * 25.2 H mm

(4) CHARACTER PATTERN -------------------5 * 7 DOTS + CURSOR

(5) CHARACTER SIZE ---------------------------2.95 W * 4.15 H mm

(6) CHARACTER PITCH-------------------------3.55 mm

(7) DOT SIZE---------------------------------------0.55 W * 0.55 H mm

(8) DOT PITCH ------------------------------------0.60 W * 0.60 H mm

NOTE：The dimension of ”C”， please refer to Outline dimension on PAGE 8/10

5. Absolute maximum ratings

5.1 Electrical absolute maximum ratings

ITEM	SYMBOL	MIN.	MAX.	UNIT	COMMENT
POWER SUPPLY FOR LOGIC	V_{DD}-V_{SS}	0	6.0	V	------
INPUT VOLTAGE	V_I	V_{SS}	V_{DD}	V	------
STATIC ELECTRICITY	------	------	100	V	NOTE(1)
POWER SUPPLY FOR B.L	NOTE(2)	------	NOTE(2)	NOTE(2)	NOTE(2)

NOTE (1): ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING A 200PF CAPACITOR AND DISCHARGING IT BY CONTACT WITH A INTERFACE CONNECTOR PIN.

NOTE (2):

B.L TYPE	SYMBOL	MAX.	UNIT	COMMENT
ARRAY LED	V_{LED}	5.0	V	YELLOW-GREEN,AMBER,ORANGE,RED
EDGE LED	V_{LED}	6.0	V	BLUE,PURE GREEN,WHITE
EL	V_{EL}	AC115V	V	f_{EL}: 1.0KHz 60SEC.MAX
	f_{EL}	2.0	KHz	AC115Vrms 60SEC.MAX

5.2 Environmental absolute maximum ratings

ITEM	CONDITION	OPERATION		STORAGE		COMMENT
		MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	NORMAL	0℃	50℃	-20℃	70℃	------
	WIDE	-20℃	70℃			
HUMIDITY	------	NOTE (3)		NOTE (3)		NO CONDENSATION
VIBRATION NOTE (3)	------	------	0.5G	------	2G	10~300Hz XYZ DIRECTIONS 1 Hr EACH
SHOCK NOTE (4)	------	------	3G	------	50G	10 msec XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	------	NOT ACCEPTABLE		NOT ACCEPTABLE		-------

NOTE (3): Ta ≦ 50℃: 90% RH MAX.

Ta ＞ 50℃: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90% RH AT 50℃. (80%RH AT 60℃)

NOTE(4):1G=9.8m/s^2

6. *Electrical characteristics*

Ta = 25℃   VDD = 5.060.25 V

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
INPUT VOLTAGE	V_{IH}	----------------		2.2	------	------	V
	V_{IL}			------	------	0.6	V
OUTPUT VOLTAGE	V_{OH}	$-I_{OH}$ =0.2 mA		2.4	------	------	V
	V_{OL}	I_{OL} = 1.2 Ma		------	------	0.4	V
POWER SUPPLY CURRENT	I_{DD}	V_{DD} = 5.0V		------	2.0	3.5	mA
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	$V_{DD}-V_O$	STN/ FSTN DUTY =1/16 Φ=10° NOTE(2)	Ta=-20°C	------	4.8	------	V
			Ta= 0°C	------	4.7	------	V
			Ta= 25°C	------	4.5	------	V
			Ta= 50°C	------	4.3	------	V
			Ta= 70°C	------	4.2	------	V
		TN DUTY =1/16 Φ=25° NOTE(2)	Ta=-20°C	------	4.5	------	V
			Ta= 0°C	------	4.4	------	V
			Ta= 25°C	------	4.2	------	V
			Ta= 50°C	------	4.0	------	V
			Ta= 70°C	------	3.9	------	V
POWER SUPPLY CURRENT FOR B.L	NOTE(3)	NOTE(3)		------	NOTE(3)	NOTE(3)	NOTE(3)

NOTE (1): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ±0.5V BY EACH MODULE.

(2): θ = 0° ：VIEWING DIRECTION AT 6 O' CLOCK

θ = 180° ：VIEWING DIRECTION AT 12 O' CLOCK

(3): LED CURRENT OF DIFFERENT BACKLIGHT TYPE

B.L TYPE	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT.	LED COLOR
ARRAY LED	I_{LED}	V_{LED} =5.0V	-----	150	200	mA	YELLOW-GREEN、AMBER、ORANGE、RED
EDGE LED	I_{LED}	V_{LED} =4.0V	-----	60	80	mA	BLUE、WHITE、PURE GREEN
EL	I_{EL}	V_{EL} =AC115V f_{EL} = 400Hz	-----	230	350	mA	----------------------

7. Optical characteristics

TN TYPE LCD

Ta = 25℃ V_{DD}-V_O =4.2V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 1.4 NOTE(1)	20	30	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 25° NOTE(1)	2.0	3.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)
	tf (fall)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)

STN TYPE LCD

Ta = 25℃ V_{DD}-V_O =4.5V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	3.0	4.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

FSTN TYPE LCD

Ta = 25℃ V_{DD}-V_O =4.5V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	4.0	5.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

Brightness for backlight

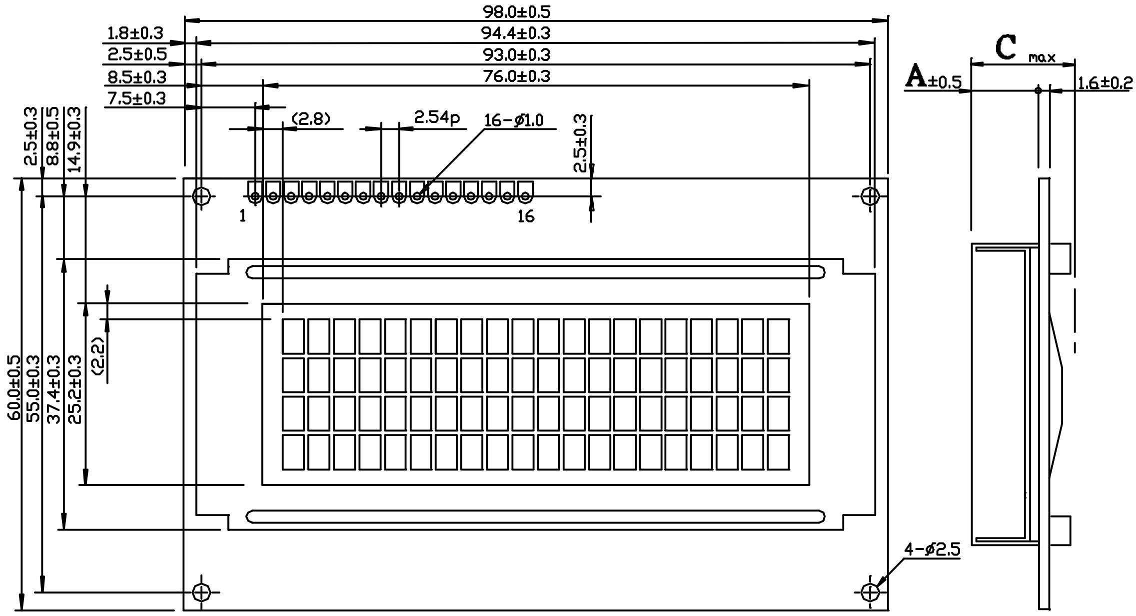
SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	B.L TYPE	NOTE
B	Φ = 0° θ = 0°	4.0	----	----	cd/m^2	EL	NOTE(2) NOTE(3)
		5.0	----	----		LED	

NOTE (1): θ = 0° : VIEWING DIRECTION AT 6 O' CLOCK
θ = 180° : VIEWING DIRECTION AT 12 O' CLOCK

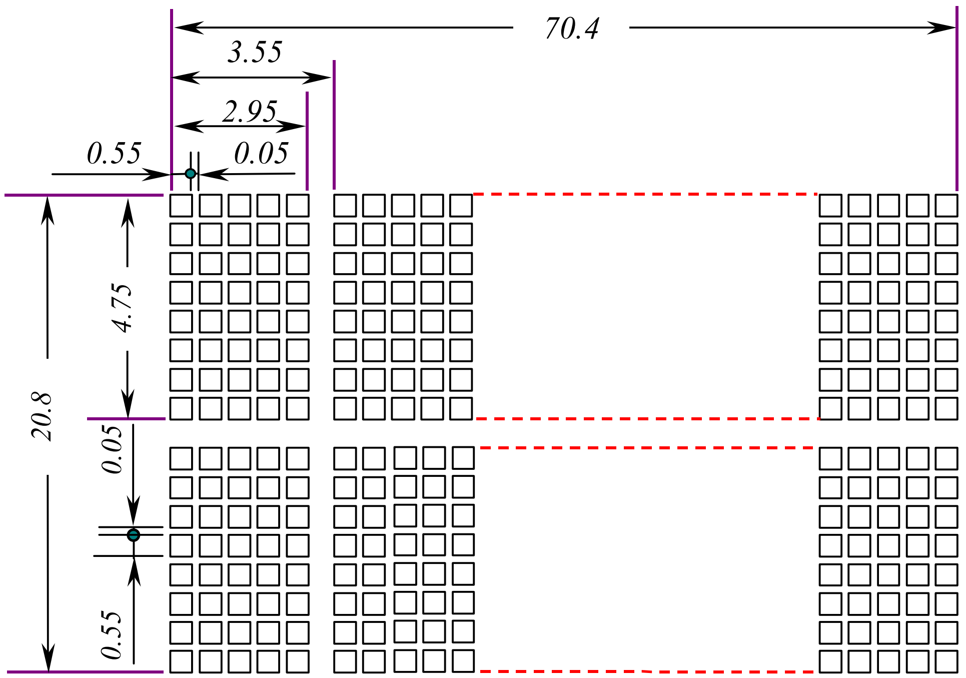
NOTE (2):SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

NOTE (3):UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM.

8. Outline dimension



TYPE	A	C
LED B.L	9.0	15.0
EL & NO B.L	5.1	10.0

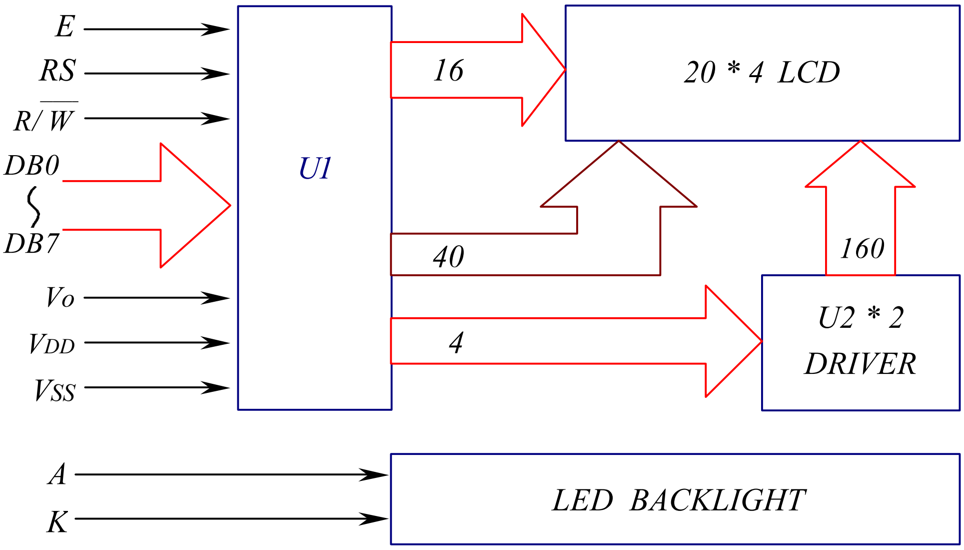


NOTE :
1.UNIT : mm
2.SCALE : NTS

Interface pin connection

PIN NO.	1	2	3	4	5	6	7	8
SYMBOL	Vss	VDD	Vo	RS	R/$\overline{W}$	E	DB0	DB1
PIN NO.	9	10	11	12	13	14	15	16
SYMBOL	DB2	DB3	DB4	DB5	DB6	DB7	A(+)	K(-)

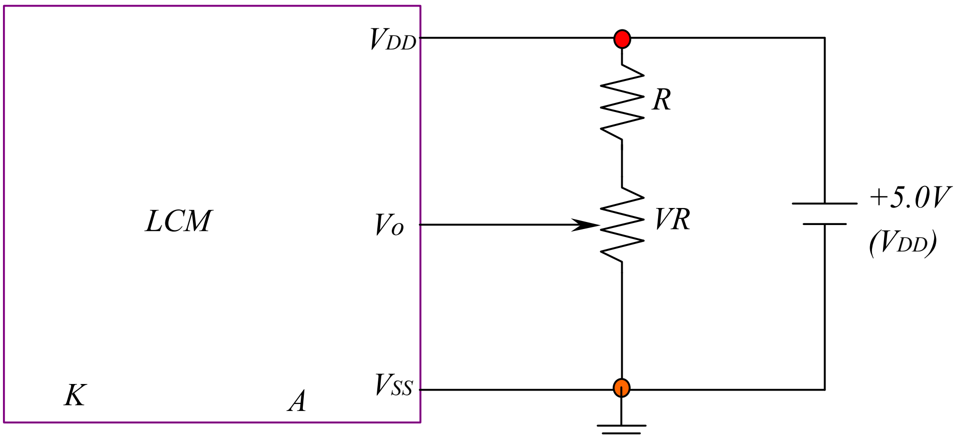
9. Block diagram



Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LINE 1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
LINE 2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53
LINE 3	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
LINE 4	54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67

10. Power supply for LCM

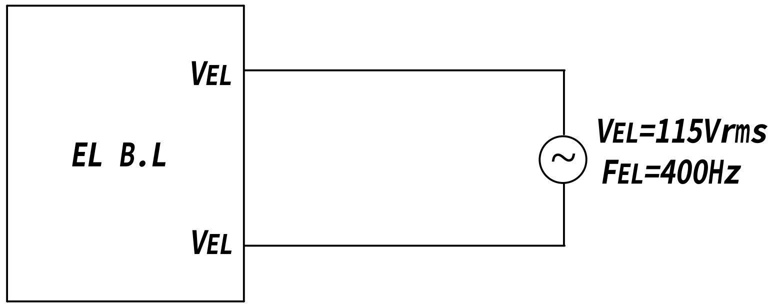


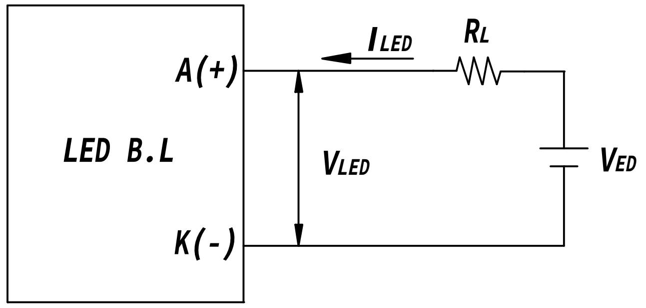
RECOMMENDED RESISTOR R: V_{DD}-V_O≧1.5V

V_{DD}–V_O: LCD DRIVING VOLTAGE

VR: 10KΩ~20KΩ

10.1 Power supply for backlight





ITEM	LED TYPE	CONDITION
Limit resister of LED (RL)	ARRAY LED	RL≧((VED-5.0V) / ILED), ILED≦200mA
	EDGE LED	RL≧((VED-4.0V) / ILED), ILED≦80mA